

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 724 263 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
05.11.2003 Bulletin 2003/45

(51) Int Cl.⁷: **G11B 20/12**, G11B 27/32,
G11B 27/034, G11B 7/00,
G11B 19/12, G11B 23/36,
G11B 20/10, G11B 7/007

(21) Application number: **96101066.7**

(22) Date of filing: **25.01.1996**

(54) **Disc-shaped recording medium, recording apparatus and reproducing apparatus**

Plattenförmiges Aufzeichnungsmedium, Aufzeichnungs- und Wiedergabegerät

Milieu d'enregistrement sous forme de disque, appareil d'enregistrement et appareil de reproduction

(84) Designated Contracting States:
DE FR GB IT NL

(30) Priority: **30.01.1995 JP 1321195**

(43) Date of publication of application:
31.07.1996 Bulletin 1996/31

(60) Divisional application:
03017960.0

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EP-A- 0 165 320 **EP-A- 0 507 397**
EP-A- 0 706 185

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DescriptionBACKGROUND OF THE INVENTION

5 1. Field of the Invention

[0001] This invention relates to a multi-session disc-shaped recording medium, such as a compact disc having both audio data and computer data recorded thereon and a recording apparatus and a reproducing apparatus for the recording medium.

10 2. Description of the Related Art

[0002] The first commercialized compact discs have been music CDs (CD-DA: compact disc-digital audio) and the standard therefor has been recently been expanded for multi-media. Typical of the standards for CD are:

15 CD-DA (compact disc-digital audio) format;
 CD-ROM (compact disc-read only memory) format;
 CD-I (compact disc-interactive) format; and
 CD-ROM/XA (CD-ROM extended architecture) format.

20 [0003] The CD-DA format is a format for audio, forms the basis for other CD formats, and prescribes the signal processing system and the physical structure of the disc. The CD-ROM format is a format extended for computer data and prescribes, as a physical block structure, a mode 1 having an error detection code (EDC) and an error correction code (ECC) as extended portions, and a mode 2 not having EDC/ECC as the extended portions. The CD-I format is
 25 a format which has picture data and character data as extended portions to audio data, and has a block structure comprised of the block structure of the CD-ROM mode 2. The CD-I format prescribes, as a physical block structure, a form 1 having the EDC/ECC as extended portions and a form 2 not having the EDC/ECC as extended portions. The CD-ROM/XA format prescribes interleaving computer data and audio data for synchronizing the computer data and the audio data. The block construction in the CD-ROM/XA format is comprised of the block construction of the CD-ROM
 30 mode 2. The CD-ROM/XA format prescribes, as a physical block structure, a form 1 having the EDC/ECC as extended portions and a form 2 not having the EDC/ECC as extended portions.

[0004] Recently, a CD-R (compact disc-recordable) disc having a recording surface coated with a organic recording material on one major surface of a disc of the same size as the compact disc (CD), and on which desired data can be written by a light beam, has been proposed, while a CD-MO (compact disc-magneto optical) for rewritable CD and a
 35 CD-WO (compact disc- write once) for a write-once optical disc have been prescribed. The compact discs of the above-mentioned various formats are currently fabricated using the CD-R disc.

[0005] With the CD format, each track has a unitary file structure written once and for all, or is an audio segment. Initially, the CD-DA disc or the CD-ROM disc is a replay- only disc, and is a single-session disc having only one session constituted by one or more tracks comprised of an audio track carrying audio data and/or a data track carrying computer data. However, since plural sessions may be recorded on the write-once disc CD-R disc, a multi-session disc has also
 40 be commercialized using the CD-R disc.

[0006] However, old generation recorders or players do not support multi-session discs. On the other hand, a format constraint is imposed on the conventional CD-R disc, such that, if an area termed data session accessible by the CD-ROM device is allowed to co-exist with the audio session in the same disc by a multi-session format, there is a
 45 risk that an audio track cannot be reproduced as audio data or data in the data track is erroneously reproduced as audio data due to the existence of the code that can possibly not be recognized with such an old generation CD player.

[0007] EP 0 507 397 A2 describes a method and device for recording information volumes in successive recording sections, which volumes comprises data files in a track of a record carrier of an inscribable type. At the end of each information volume a lead-out signal is recorded denoting the end of the information volume concerned. The lead-out
 50 signals comprise control information for controlling the reading of information. When the record carrier is read out, the read-out signal of the information volume recorded last is searched for and read out. This information is used for controlling the reading of data files included in the information volumes.

[0008] A disc-shaped recording medium on which are recorded a first data signal, such as digital audio data, a second data signal in the direction of reproduction of the disc, such as digital video data and computer program data, and
 55 identification data recorded in the read-in track for representing the fact that the second data signal has been recorded is disclosed by EP 0 165 320. Also disclosed is an apparatus for reproducing the above-described disc-shaped recording medium. The apparatus includes: a circuit for processing the reproduction of the first data signal; a circuit for processing the reproduction of the second data signal; and a control circuit which is supplied with reproduction control

data for discriminating between a conventional disc-shaped recording medium on which the first data signal alone has been recorded and a disc-shaped recording medium on which both the first and second data signals have been recorded. By the output of the control circuit, the control of the reproducing operation of a pickup is changed over, and the circuits for processing the reproduction of the first and second data signals are also changed over from one to the other.

SUMMARY OF THE INVENTION

[0009] In view of the above-described status of the related art, it is an object of the present invention to provide a multi-session disc-shaped recording medium having an audio session which can be reliably audio-reproduced with an old generation CD player, a recording apparatus and a reproducing apparatus for such multi-session disc-shaped recording medium.

[0010] This object is achieved by a disc-shaped recording medium, an apparatus for recording audio data and/or computer data from a disc-shaped recording medium and an apparatus for reproducing audio data and/or computer data from a disc-shaped recording medium according to the enclosed independent claims. Advantageous features of the present invention are defined in the corresponding subclaims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a block diagram showing an arrangement of an optical disc recording/reproducing apparatus according to the present invention.

Fig. 2 illustrates the logical structure of a CD-R disc employed in the recording/reproducing apparatus.

Fig. 3 illustrates a data structure of the TOC information recorded in the TOC area of the CD-R disc.

Fig. 4 is a flow chart showing the control operation by a CPU block 30 during writing in the CD-R drive in the optical disc recording/reproducing system.

Fig. 5 is a flow chart showing the control operation by the CPU block 30 during readout of the CD-drive.

Fig. 6 is a flow chart showing the sequence of the disc discrimination by the CPU block 30 of the CD-R drive.

Fig. 7 is a flow chart showing the sequence followed in the writing of audio tracks and data tracks.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Referring to the drawings, a disc-shaped recording medium, a recording apparatus and a reproducing apparatus for the recording medium will be explained in detail. With the embodiment, now to be described, the present invention is applied to an optical disc recording/reproducing system employing a CD-R disc as a medium.

[0013] The optical disc recording/reproducing system includes a host computer 1, and a CD-R drive 3 connected to the host computer 1 via a SCSI (small computer system interface) bus 2, as shown in Fig. 1. A write-once type CD-R disc 10 is detachably loaded on the CD-R drive 3. Plural disc drives may be connected via a daisy chain construction to the SCSI bus 2.

The CD-R drive 3 includes an external interfacing circuit 31 connected to the SCSI bus 2, a central processing unit (CPU) 30, and a buffer memory 32. The buffer memory 32 is connected to an encoder/decoder circuit 33 which, in turn, is connected to a driver 34, a signal processing circuit 35, and the CPU block 30. The CPU block 30 is also connected to a servo circuit 36 and a memory 37. In addition, the CD-R drive includes a spindle motor 38, a thread block 39 and an optical block 40 connected to the servo circuit 36. The CD-R disc 10 may be detachably loaded on a spindle shaft 38A of the spindle motor 38.

[0014] The CPU block 30, functioning as control means for the CD-R drive 3, includes a CPU, a ROM, a working RAM, a register and an input/output interface (all not shown). In the ROM are pre-recorded program data for deciphering commands for the SCSI interface and program data for performing a processing based upon SCSI interfacing. The buffer memory 32 temporarily stores data recorded on the CD-R disc 10 or data read out from the CD-R disc 10, under control by the CPU block . In the memory 37 is transiently stored the TOC information specifying the recording contents of the CD-R disc 10. Data write/readout in or from the memory is executed by the CPU block 30. The encoder/decoder circuit 33 encodes the recording data and decodes the playback data, under control of the CPU block 30.

[0015] The driver 34 drives a laser light source (not shown) of the optical block 40 optically scanning the CD-R disc 10 under control of the CPU block 30, and is connected to both the encoder/decoder circuit 33 and to the optical block 40. The driver 34 is responsive to recording data sent from the encoder/decoder circuit 33 in order to drive the laser light source intermittently for generating the intensity of the laser light required for recording during the recording mode, and for generating the (lower) intensity of the laser light required for reproduction during the playback mode.

[0016] The signal processing circuit 35 processes playback RF signals produced on optically scanning the CD-R disc 10 by the optical block 40 and sends the results of processing to the CPU block 30 and to the encoder/decoder circuit 33. The servo circuit 36 controls the operation of the spindle motor 38, thread block 39 and the optical block 40, under control by the CPU block 30. The servo circuit 36 controls the speed of rotation of the spindle motor 38, the feed of the optical block 40 by the thread block 40 and the focusing and the tracking of the optical block 40 designed for optically scanning the CD-R disc 10, based upon speed reference data, recording position/playback position specifying data or playback RF signals supplied from the optical block 40.

[0017] The CD-R disc 10 has a logical structure as shown in Fig. 2. That is, the CD-R disc 10 is a multi-session disc having a light intensity calibration area PCA, a program memory area PMA, a first session SS1, a second session SS2 and a third session SS3, arranged sequentially in a direction radially outwardly from the disc center 11. The light intensity calibration area PCA is a test write area for deciding the laser power of the laser light for data write/readout in the CD-R drive 3. The CD-R drive 3 controls tentative writing in the light intensity calibration area PCA of the CD-R disc 10 by the CPU block 30 in order to decide the laser power, that is the light intensity, of the laser light for data write/readout for controlling the driver 34 for generating an optimum volume of the laser light from the laser light source of the optical block 4. The program memory area PMA is an area in which the information concerning the tracks of all sessions on the disc is updated and preserved.

[0018] The CD-R drive 3 reads out the information concerning the tracks of all sessions on the disc from the program memory area PMA of the CD-R disc 10 by the CPU block 30 and causes the read-out data to be stored in the memory 37. This information is referred to herein as the PMA information. The CD-R drive 3 updates the PMA information in the memory 37 each time the recording operation is executed. For example, at the end of the recording operation, the CD-R drive causes the latest PMA information to be read out from memory 37 and records the read-out information in the program memory area PMA.

[0019] Each of the sessions SS2 and SS3 is an area for recording audio data, computer data, or both kinds of data. As will be explained further herein, the session SS1 is made up only of audio tracks. Each of the sessions SS1 - SS3 is comprised of a lead-in area LIA specifying the beginning of a session, a program area PRA made up of one or more tracks and a lead-out area LOA specifying the end of the session. In the present embodiment, the first session SS1 is defined as an audio session, and has its program area PRA constituted by three audio tracks, track numbers TNO = 1 to 3, having audio data recorded therein.

[0020] In the respective lead-in areas (LIA) of the sessions SS1, SS2 and SS3, the information concerning the recorded tracks and the information concerning the disc are encoded in the sub-code Q-channel as the table-of-contents (TOC) information and recorded in the respective TOC areas. The TOC information is a data structure prescribed by CD format standards and is composed of synchronizing bits S0, S1 used by a decoder to distinguish a control word in a block from audio information, CONTROL (an identification of the kind of information within a track), ADR (the value of which determines what kind of information is in the block, i.e. TOC items, a disc identification item, a skip track item, etc.), TNO (track number), POINT (index number within a track), MIN, SEC, FRAME (which together can specify the running time within a track), ZERO, the starting point of a track indicated by PMIN, PSEC, PFRAME and data relating to error correction CRC, as shown in Fig. 3. An explanation of the significance of each of these terms, as may be necessary, will be given further in this specification.

[0021] The CD-R drive 3 formulates the TOC information of respective sessions of the CD-R disc 10 by the CPU block 30 in the memory 37 in order to read out the TOC information of the respective sessions from the memory 37 on termination of the recording operation and in order to record the read-out TOC information in the respective TOC areas of the sessions.

[0022] PMIN at POINT = A0 in the TOC area is defined so as to give the value of the leading track number of the program area, while PSEC is defined so as to give the following disc type codes [00], [10], [20] which specify the disc format in hexadecimal numbers:
i.e.

PSEC =	Disc type =
00	CD-DA and CD-ROM;
10	CD-I;
20	CD-ROM/XA

[0023] For giving the disc type code to the multi-session disc, the CD-R drive 3 causes a common disc type code specifying the disc format of the multi-session disc to be recorded by the CPU block 30 in PSEC at POINT = A0 of the TOC area of each lead-in area LIA of each of the sessions other than the first session SS1, that is the sessions SS2 and SS3.

[0024] In the present embodiment, in order to give the session format in the multi-session disc, PMIN at POINT =

A0 of the TOC area gives the value of the leading track number of the program area of the session, while PSEC gives the session formats [00], [10] and [20] as defined below:

PSEC =	Session type =
00	CD audio session or CD-ROM mode I session;
10	CD-I session;
20	CD-ROM/XA session.

[0025] The CD-R drive 3 causes the CPU block 30 to record [00] as PSEC at POINT A0 in the TOC area of the lead-in area LIA of the first session SS1, in which [00] specifies that the first session SS1 is an audio session having the program area PRA made up only of audio tracks.

[0026] In the above-described CD-R drive 3, the CPU block 30 is responsive to the write command from the host computer 1 to effect the control operation shown by the flow chart of Fig. 4 when recording data on the CD-R disc 10. If a CD-R disc 10, the disc type of which is not defined, is loaded, the disc type code specifying the disc type, that is the disc type code [00] specifying the CD-DA and CD-ROM, disc type code [10] specifying the CD-I or the disc type code [20] specifying the CD-ROM/XA is written at step S1 in the program memory area PMA of the CD-R disc 10 in order to denote the disc type of the CD-R disc 10. For example, if the disc type code [20] is written in the program memory area PMA, the CD-R disc 10 is denoted as a CD-ROM/XA type disc.

[0027] At step S2, the track is written in the program area PRA of the CD-R disc 10. The details of this operation will be explained further herein in regard to Fig. 7. It is then judged at step S3 whether or not the session has come to an end. If the result of decision at step S3 is NO, that is if the session has not come to a close, the CPU block 30 reverts to step S2 for reiterating track writing. If the result of decision at step S3 is YES, that is if the session has come to a close, the CPU block 30 advances to step S4.

[0028] At step S4, it is judged whether or not the leading track of the session is an audio track. If the result of decision at step S4 is YES, that is if the leading track of the session is an audio track, the CPU block 30 transfers to step S5 in order to give the disc type code [00] specifying the audio session as the TOC information for the session. The CPU block 30 then transfers to step S7 for writing the lead-in area LIA and the lead-out area LOA. The CPU block 30 then reverts to step S2 for recording the new session. On the other hand, if the result of decision at step S4 is NO, that is if the leading track of the session is not an audio track, the CPU block 30 transfers to step S6 in order to give the disc type code defined in the program memory area PMA, such as [20], as the TOC information for the session. The CPU block 30 then transfers to step S7 for writing in the lead-in area LIA and in the lead-out area LOA. The CPU block 30 then reverts to step S2 for recording the new session.

[0029] Referring now more particularly to Fig. 7, the details of step S2 of Fig. 4 will now be explained. At a first step S100, the CPU block 30 determines if this is the first session (SS1). If the determination is YES, the CPU block 30 proceeds to step S101 where the CPU block 30 determines if audio data is being recorded. If the answer is negative, the operation is ended. If, at step S101, the CPU block 30 determines that the data to be written is audio data, the CPU block 30 proceeds to step S102 and determines if there is a data (i.e. a CD-ROM/XA or CD-I data) track already recorded in the first session (SS1). If so, the operation is ended. If not, the CPU block 30 proceeds to step S103 to write the data in an audio track and end the operation. The completion of these steps S100 - S103 ensures that only audio data is written in the first session, i.e. SS1= an audio session. The first session is thus designated as the "specified" or "particular" session.

[0030] If at step S100 the CPU block 30 determines that the session is subsequent to the first session (SSn, where $n \neq 1$), the CPU block 30 determines next at step S104 if the data is of the CD-ROM/XA type or the CD-I type. If so, the CPU block 30 proceeds to step S105 where the CPU block 30 determines if there is audio data in the first track of the session. If so, the operation is ended. If not, the CPU block 30 proceeds to step S106 where a CD-ROM/XA or CD-I data track is written and the operation is ended. The completion of steps S100, S104 - S106 ensures that for any session other than the first session, CD-ROM/XA or CD-I data will not be written in the session if there is audio data in the first track.

[0031] At step S104, if the CPU block 30 determines that the data to be recorded is not of the CD-ROM/XA type or the CD-I type, the CPU block 30 next determines at step S107 if the data is audio data. If not, the operation is ended. If so, the CPU block 30 determines at step S108 if the first track of the session is the CD-ROM/XA type data or the CD-I type data. If not, the CPU block 30 determines at step S109 if there is no data recorded in the session. If the answer is negative, i.e. there is data recorded in the session, the operation is ended. If not, the CPU block 30 proceeds to step S110. Conversely, if the determination at step S108 is affirmative, the CPU block 30 also proceeds to step S110. At step S110 the CPU block 30 writes the audio data to an audio track. The completion of steps S107 - S110 ensures that for a session other than the first session either only an audio track is written. or that a data track is written as the first track of the session and any audio tracks are written subsequent to the data tracks in the session, i.e. SSn = a

data session or an audio session, or both, where $n \neq 1$. Altogether, steps S100, S104 to S110 ensure that for any given session subsequent to the first session, only data tracks are written in the session, only audio tracks are written in the session, or if both audio tracks and data tracks are written in the session, the data tracks are written ahead of the audio tracks.

[0032] In summary, in recording data, the CPU block 30 sets the first session SS1 among the plural sessions as a particular session, and causes only audio data to be recorded in the first session SS1, while causing audio data and computer data to be recorded in subsequent sessions so that audio data will be recorded subsequent to the data track in the sessions comprised of other audio and data tracks.

[0033] Thus it is possible with the present CD-R drive to produce a multi-session CD having a disc type code area in which, responsive to write commands from the host computer 1, audio data and/or computer data are recorded on the track basis in plural sessions on the CD-R disc 10 and the disc type code is also recorded in which a common disc type code is recorded in sessions other than a particular session among the plural sessions, which multi-session CD also has a disc type code area having recorded therein a disc type code specifying that the particular session is made up only of audio tracks, in which the particular session is an audio session composed only of audio tracks. With the multi-session CD thus prepared, it is possible to hold audio data and/or computer data in sessions other than the particular session among plural sessions constituted by one or more tracks comprised of audio tracks and/or data tracks, to hold the common disc type code in the disc type code area of the sessions other than the particular session, hold only audio data in the particular session, and to hold the disc type code specifying that the particular session is made up only of audio tracks in the disc type code area of the particular session.

[0034] That is, the CPU block 30 in the CD-R drive 3 functions as recording control means for recording only audio data in the particular session which is set as an audio session constituted only by audio tracks and for recording audio data or computer data in other sessions, while also functioning as disc type code recording control means for recording a common disc type code in the disc type code area of sessions other than the particular session and for recording the disc type code specifying that the particular session is only for audio tracks in the disc type code area of the particular session.

[0035] Also, with the present CD-R drive, the CPU block 30 sets the first session SS1 among the plural sessions as the particular session and records only audio data in the first session SS1 responsive to write commands from the host computer 1 to render it possible to fabricate the multi-session CD having audio sessions capable of reliably reproducing audio data with the old-generation CD player. In addition, with the present CD-R drive 3, the CPU block 30 causes the audio data and computer data to be recorded to form an audio track, subsequent to all data tracks in a session made up of the audio tracks and the data tracks, so that a multi-session CD may be fabricated in which the audio tracks are provided subsequent to the data tracks in a session. With the multi-session CD, thus prepared, since the audio track is provided subsequent to the data track in the session made up of the audio track and the data track, it may be judged whether or not the session is an audio session depending on whether or not the leading track in the session is an audio track or a data track.

[0036] During reproduction of recorded information by the present CD-R drive 3, when reading out data from the CD-R disc 10 responsive to the readout command from the host computer 1, the CPU block 30 performs the control in accordance with the flow chart shown in Fig. 5. When the CD-R disc 10 is loaded, the TOC information of all sessions is read out at step S11. The disc type is discerned at step S12 before the CPU block 30 transfers to step S13. At step S13, the command supplied from the host computer 1 is discerned. If the command is an audio data readout command, the CPU block 30 transfers to step S14. If the command is a computer data readout command, the CPU block 30 transfers to step S15. If no command is supplied, the command judgment is carried out repeatedly to await the supply of the next command.

[0037] At the step S14, the encoder/decoder circuit 33 is controlled for reproducing the CD-DA and the operation is thereafter ended. Alternatively, at the step S15, it is judged, based upon the disc type code recorded in the disc-type code area of the sessions having computer data tracks therein, whether or not the reproduced data format is the CD-I type or the CD-ROM/XA type.

[0038] If the result of judgment at step S15 is NO, that is if the reproduced data format is not the CD-I type nor the CD-ROM/XA type, the CPU block 30 transfers to step S16 in order to control the encoder/decoder circuit 33 and in order to effect decoding in the so-called CD-ROM mode 1 and the CD-ROM mode 2 for reproduction. The mode 1 and mode 2 refer to recognized CD-ROM format standards.

[0039] If the result of decision at step S15 is YES, that is if the reproduced data format is CD-I or CD-ROM/XA, the CPU block 30 transfers to step S17 in order to control the encoder/decoder circuit 33 and in order to effect decoding in the CD-I or CD-ROM/XA form 1 or form 2 for reproduction. The form 1 and form 2 refer to recognized CD-ROM format standards.

[0040] Thus it is possible with the present CD-R drive 3 to discriminate the common disc type code recorded in the disc type code area of the sessions other than the particular session made up only of audio tracks by the CPU block 30 and to switch the coding responsive to the disc type code for reliable reproduction. That is, the CPU block 30 in the

CD-R drive 3 functions as disc type code discriminating means for discriminating the common disc type code recorded in the disc type code area of sessions other than the particular session, while also functioning as control means for switching the decoding by the encoder/decoder circuit 33 responsive to the disc type code discriminated by the disc type code discriminating means.

[0041] The CPU block 30 effects disc type discrimination at step S12 in accordance with the procedure shown in a flow chart of Fig. 6. That is, in discriminating the disc type, it is judged whether or not the leading track of the session, i.e. the first track, is an audio track. If the result of decision at step S21 is NO, that is if the leading track of the session is not an audio track, the CPU block 30 transfers to step S22. If the result of the decision at step S21 is YES, that is if the leading track of the session is an audio track, the CPU block 30 transfers to step S23.

[0042] At step S22, the CPU block 30 decides the disc type depending upon the disc type code afforded as the TOC information of the session, and terminates the disc type discrimination. Alternatively, at step S23, the CPU block 30 judges whether or not the session is the last session. If the result of decision at step S23 is NO, that is if the session is not the last session, the CPU block 30 advances to the next session at step S24 and reverts to step S21 in order to decide whether or not the leading track of the next session is the audio track. If the result of decision at step S23 is YES, that is if the session is the last session, the CPU block 30 transfers to step 25 where the disc type is determined to be [00] to terminate the disc type discriminating operation.

[0043] That is, the CPU block 30 in the CD-R drive 3 functions as disc type discriminating means for detecting the session whose leading track is a data track, based upon the playback data from the CD-R disc 10, and discriminates the disc type code recorded in the disc type code area of the session as a common disc type code. Thus it is possible with the present CD-R drive 3 to promptly discriminate by the CPU block 30 the common disc type code recorded in the disc type code area of the sessions other than the particular session among the plural sessions which is comprised only of the audio tracks and to switch the coding operation depending upon the disc type code by way of effecting reproduction.

[0044] It is possible with the disc-shaped recording medium of the present invention to hold audio data and/or computer data in sessions other than the particular session, comprised of one or more audio tracks and/or data tracks, to hold the common disc type code in the disc type code area of each of the sessions other than the particular session, to hold only audio data in the particular session and to hold in the disc type code area of the particular session the disc type code specifying that the particular session is comprised only of the audio tracks. By setting the first session among the plural sessions as the particular session, the disc-shaped recording medium of the present invention becomes a multi-session disc-shaped recording medium having an audio session positively audio-reproducible with the old-generation CD player.

[0045] With the disc-shaped recording medium according to the present invention, since an audio track is always provided subsequent to a data track in the sessions comprised of both of the audio tracks and the data tracks, it may be judged whether the session is an audio session depending upon whether or not the leading track of the session is a data track.

[0046] With the recording apparatus of the present invention, a particular session is used as an audio session comprised only of audio tracks and audio data and/or computer data are recorded in the remaining sessions, under control by recording control means. Further, a common disc type code is recorded in the disc type code areas of the sessions other than the particular session, among the plural sessions, while a disc type code specifying that the session is comprised only of audio tracks is recorded in the disc type code area of the particular session, under control by the disc type code recording control means. Thus it becomes possible to produce a disc-shaped recording medium having plural sessions each being made up of one or more tracks, that is audio tracks having audio data recorded thereon and/or data tracks having computer data recorded thereon, including a disc type code area in which a common disc type code is recorded in other than a particular session among the plural sessions, in which the particular session is an audio session comprised only of audio tracks and having recorded therein a disc type code specifying that the particular session is comprised only of audio tracks.

[0047] With the recording apparatus of the present invention, the disc type code recording control means causes the disc type code to be recorded in a disc type code area of the lead-in area of a disc-shaped recording medium having respective sessions each comprised of a lead-in area specifying the beginning of the session, a program area comprised of audio tracks and/or data tracks and a lead-out area specifying the end of the session. Thus it becomes possible to produce a disc-shaped recording medium whose particular session is an audio session comprised only of audio tracks and has recorded therein a disc type code specifying that the session is comprised only of audio tracks, and whose plural sessions are each comprised of a lead-in area specifying the beginning of the session, a program area comprised of audio tracks and/or data tracks and a lead-out area specifying the end of the session, with the lead-in area having a disc type code area having the disc type code recorded therein.

[0048] With the recording apparatus of the present invention, the first session among plural sessions is the particular session, and only audio data is recorded in the first session under control by the recording control means. Thus it becomes possible to produce a disc-shaped recording medium whose particular session is an audio session comprised

only of audio tracks and has recorded therein a disc type code specifying that the session is comprised only of audio tracks, and whose first session among the plural sessions is the particular session.

[0049] With the recording apparatus of the present invention, the recording control means effects audio data and computer data recording control so that the audio track is provided subsequent to the data track in the session comprised of the audio track and the data track. Thus it becomes possible to produce a disc-shaped recording medium whose particular session is an audio session comprised only of audio tracks and has recorded therein a disc type code specifying that the session is comprised only of audio tracks, and whose first session among the plural sessions is the particular session, in which the audio track is provided subsequent to the data track in a session comprised of the audio track and the data track.

[0050] With the reproducing apparatus for a disc-shaped recording medium, since the common disc type code recorded in the disc type code area of the sessions other than the particular session comprised only of audio tracks is discriminated by disc type code discriminating means, decoding by decoding means is switched by control means depending upon the disc type code and playback data from the disc-shaped recording medium is decoded responsive to the disc type code, it becomes possible to reliably reproduce a disc-shaped recording medium having plural sessions comprised of one or more tracks having an audio track having audio data recorded thereon and a data track having computer data recorded thereon, in which each of the sessions other than the particular session has a disc type code area having a common disc type code recorded therein, the particular session is an audio session made up only of audio tracks, and in which the particular session has a disc type code area having recorded therein a disc type code area specifying that the particular session is made up only of audio tracks.

[0051] With the reproducing apparatus for a disc reproducing apparatus for a disc-shaped recording medium according to the present invention, the disc type code discriminating means detects the session whose leading track is a data track based upon playback data from the disc-shaped recording medium, and discriminates the disc type code recorded in the disc type code of the session as being a common disc type code, it becomes possible to promptly discriminate the disc type of the disc-shaped recording medium in which the particular session is an audio session comprised only of the audio tracks, in which the particular session has the disc type code area indicating that the session is comprised only of audio tracks, and in which an audio track is provided subsequent to the data track in the session comprised of the audio track and the data track.

[0052] Thus the present invention provides a multi-session disc-shaped recording medium capable of reliably reproducing audio data with an old-generation CD player, a recording apparatus and a reproducing apparatus for the recording medium.

Claims

1. A disc-shaped recording medium (10) having plural sessions (SS1,...) each comprised of one or more tracks (TNO=01,...), wherein the tracks (TNO=01,...) include one or more audio tracks containing audio data recorded thereon and one or more data tracks containing computer data recorded thereon, each session having a disc type code area (PSEC) in which one of a common disc type code and a particular disc type code is recorded, a particular disc type code being recorded in the disc type code area (PSEC) located in an audio session comprised only of one or more audio tracks, wherein said audio session corresponds to the first session (SS1) among the plural sessions (SS1,...), said first session (SS1) corresponds to the innermost session radially in relation to the disc-shaped recording medium (10) and information concerning the tracks of all sessions are updated and preserved in a program memory area (PMA).
2. The disc-shaped recording medium (10) as claimed in claim 1, wherein the plural sessions (SS1,...) are each comprised of a lead-in area (LIA) specifying the beginning of the session and having the disc type code area (PSEC), a program area (PRA) having the one or more audio tracks and the one or more data tracks, and a lead-out area (LOA) specifying the end of the session.
3. The disc-shaped recording medium (10) as claimed in any one of the preceding claims, in which, in a session comprised of both the audio tracks and the data tracks, the audio track is provided subsequent to all of the data tracks.
4. Apparatus (3) for recording audio data and/or computer data on a disc-shaped recording medium (10) having plural sessions (SS1,...) each comprised of a disc type code area (PSEC) and one or more tracks (TNO=01,...), the tracks (TNO=01,...) including at least one audio track containing audio data recorded thereon and one or more data tracks containing computer data recorded thereon, and wherein a particular session is an audio session

having only one or more audio tracks and information concerning the tracks of all sessions are updated and preserved in a program memory area (PMA), the apparatus comprising:

recording means (40) for recording audio data or computer data in each session on the disc-shaped recording medium (10);
data recording control means (30) for controlling the recording means (40) so that only audio data is recorded in the particular session and for causing audio data and/or computer data to be recorded in other sessions; and
disc type code recording control means (30) for causing a particular disc type code indicating that the session is comprised only of the audio tracks to be recorded in the disc type code area (PSEC) in the particular session,

wherein said recording control means (30) defines the first session (SS1) of the plural sessions (SS1,...) as said particular session and only audio data is recorded in said first session (SS1).

5. The apparatus (3) of claim 4, wherein the disc type code recording means controls the recording means (40) to record a common disc type code in a disc type code area (PSEC) of each of the sessions other than the particular session to thereby indicate that each of such other sessions contains a data track.

6. The apparatus (3) as claimed in claims 4 or 5, wherein the plural sessions (SS1,...) are each comprised of a lead-in area (LIA) specifying the beginning of a session and having the disc type code area (PSEC), a program area (PRA) comprised of the one or more audio tracks or the one or more data tracks, and a lead-out area (LOA) specifying the end of the session.

7. The apparatus (3) as claimed in any one of claims 4 to 6, in which the recording control means (30) causes the audio data and the computer data to be recorded in one or more sessions (SS2,...) each comprised of one or more audio tracks and one or more data tracks, with the one or more audio tracks being recorded subsequent to the one or more data tracks in each session.

8. The apparatus (3) as claimed in any one of claims 4 to 7, wherein the disc-shaped recording medium (10) further includes a program memory area (PMA) for recording therein information, including disc type codes, relative to the data tracks and the audio tracks of all sessions (SS1,...) and wherein the apparatus (3) further comprises memory means for storing the information recorded in the program memory area.

9. The apparatus (3) as claimed in claim 8, wherein the code recording control means (30) detects if a leading track (TNO=01) of a session (SS1,...) is not an audio track (TNO) and, if so, supplies to the recording means (40) from the memory means the disc type code recorded in the program memory area (PMA) so that the common disc type code is recorded in the disc type code area (PSEC) of the session by the recording means (40).

10. An apparatus (3) for reproducing audio data and/or computer data from a disc-shaped recording medium (10) having plural sessions (SS1,...) each comprised of one or more tracks (TNO=01,...), the tracks (TNO=01,...) including one or more audio tracks having audio data recorded thereon and one or more data tracks having computer data recorded thereon wherein information concerning the tracks of all sessions are updated and preserved in a program memory area (PMA), the apparatus comprising:

reproducing means (40) for reproducing signals corresponding to the audio data or the computer data from the disc-shaped recording medium (10);
decoding means (33) for decoding the reproduced signals into the audio data or the computer data;
discriminating (30) means for discriminating between an audio session, in which only audio tracks are recorded, and a session in which at least one or more data tracks are recorded, by means of a disc type code recorded in a disc type code area (PSEC) located in each of the sessions (SS1,...), the disc type code indicating whether the session includes only one or more audio tracks or at least one data track; and
control means (30) for switching the decoding operation by the decoding means (32) responsive to the disc type code discriminated by the discriminating means so that the audio data and the computer data are appropriately decoded by the decoding means,

wherein the audio session corresponds to a first session (SS1) among the plural sessions (SS1,...) and wherein the discriminating means identifies the first session (SS1) as the audio session in response to the disc type code recorded in the disc type code area (PSEC) of the first session (SS1).

11. The apparatus (3) as claimed in claim 10, wherein the plural sessions (SS1,...) are each comprised of a lead-in area (LIA) specifying the beginning of the session and having the disc type code area (PSEC), a program area (PRA) having the one or more audio tracks or the one or more data tracks, and a lead-out area (LOA) specifying the end of the session.

12. The apparatus (3) as claimed in claim 10 or 11, in which, in a session comprised of both the audio tracks and the data tracks, the audio track is provided subsequent to all of the data tracks.

13. The apparatus (3) as claimed in claim 12, wherein the disc type code area (PSEC) is located at a leading end of a data track in each data session.

Patentansprüche

1. Plattenförmiger Aufzeichnungsträger (10), der mehrere Sessionen (SS1, ...) hat, die jeweils aus einem oder mehreren Tracks (TNO = 01, ...) bestehen, wobei die Tracks (TNO = 01, ...) einen oder mehrere Audiotracks aufweisen, die Audiodaten, die darauf aufgezeichnet sind, enthalten, und einen oder mehrere Datentracks, die Computerdaten, die darauf aufgezeichnet sind, enthalten,

wobei jede Session einen Plattenartencodereich (PSEC) hat, in welchem einer von einem allgemeinen Plattenartencode und einem speziellen Plattenartencode aufgezeichnet ist, wobei ein spezieller Plattenartencode im Plattenartencodereich (PSEC) aufgezeichnet ist, der in einer Audiosession angeordnet ist, welche lediglich aus einem oder mehreren Audiotracks besteht,

wobei die Audiosession der ersten Session (SS1) unter den mehreren Sessionen (SS1, ...) entspricht, die erste Session (SS1) der innersten Session radial in bezug auf den plattenförmigen Aufzeichnungsträger (10) entspricht, und

die Information, welche die Tracks aller Sessionen betrifft, in einem Programmspeicherbereich (PMA) aktualisiert und gespeichert ist.

2. Plattenförmiger Aufzeichnungsträger (10) nach Anspruch 1, wobei die mehreren Sessionen (SS1, ...) jeweils einen Einlaufbereich (LIA), der den Anfang der Session angibt und der den Plattenartencodereich (PSEC) aufzeigt, einen Programmbereich (PRA), der den einen oder mehrere Audiotracks und der den einen oder mehrere Datentracks hat, und einen Auslaufbereich (LOA) enthalten, der das Ende der Session angibt.

3. Plattenförmiger Aufzeichnungsträger (10) nach einem der vorhergehenden Ansprüche, bei dem in einer Session, welche sowohl aus den Audiotracks als auch den Datentracks besteht, der Audiotrack im Anschluss an alle Datentracks vorgesehen ist.

4. Gerät (3) zum Aufzeichnen von Audiodaten und/oder Computerdaten auf einem plattenförmigen Aufzeichnungsträger (10), der mehrere Sessionen (SS1, ...) hat, wobei jede einen Plattenartencodereich (PSEC) und einen oder mehrere Tracks (TNO = 01, ...) enthält, wobei die Tracks (TNO = 01, ...) zumindest einen Audiotrack, der Audiodaten, welche darauf aufgezeichnet sind, enthält, und einen oder mehrere Datentracks aufweisen, die Computerdaten, die darauf aufgezeichnet sind, enthalten, und wobei eine spezielle Session einer Audiosession ist, die lediglich einen oder mehrere Audiotracks hat, und Information, welche die Tracks aller Sessionen betrifft, in einem Programmspeicherbereich (PMA) aktualisiert und gespeichert wird, wobei das Gerät aufweist:

eine Aufzeichnungseinrichtung (40), um Audiodaten oder Computerdaten in jeder Session auf dem plattenförmigen Aufzeichnungsträger (10) aufzuzeichnen;

eine Datenaufzeichnungs-Steuerungseinrichtung (30), um die Aufzeichnungseinrichtung (40) so zu steuern, dass lediglich Audiodaten in der speziellen Session aufgezeichnet werden und um zu veranlassen, dass Audiodaten und/oder Computerdaten in anderen Sessionen aufgezeichnet werden; und

eine Plattenart-Codeaufzeichnungs-Steuerungseinrichtung (30), um zu veranlassen, dass ein spezieller Plattenartencode, der zeigt, dass die Session lediglich aus den Audiotracks besteht, im Plattenartencodereich (PSEC) in der speziellen Session aufgezeichnet wird,

wobei die Aufzeichnungssteuerungseinrichtung (30) die erste Session (SS1) der mehreren Sessionen (SS1, ...) als die spezielle Session definiert und lediglich Audiodaten in der ersten Session (SS1) aufgezeichnet werden.

5. Gerät (3) nach Anspruch 4, wobei die Plattenartencode-Aufzeichnungseinrichtung die Aufzeichnungseinrichtung (40) so steuert, um einen allgemeinen Plattenartencode in einem Plattenarten-Codebereich (PSEC) jeder der Sessionen mit Ausnahme der speziellen Session aufzuzeichnen, um dadurch zu zeigen, dass eine jede dieser anderen Sessionen einen Datentrack enthält.

6. Gerät (3) nach Anspruch 4 oder 5, wobei die mehreren Sessionen (SS1,...) jeweils einen Einlaufbereich (LIA), der den Anfang einer Session angibt und einen Plattenartencodebereich (PSEC) aufweist, einen Programmbereich (PRA), der aus einem oder mehreren Audiotracks oder einem oder mehreren Datentracks besteht, und einen Auslaufbereich (LOA) enthalten, der das Ende des Session angibt.

7. Gerät (3) nach einem der Ansprüche 4 bis 6, bei dem die Aufzeichnungssteuerungseinrichtung (30) bewirkt, dass die Audiodaten und die Computerdaten in einer oder mehreren Sessionen (SS2, ...) aufgezeichnet werden, wobei jede einen oder mehrere Audiotracks und einen oder mehrere Datentracks enthält, wobei der eine oder mehrere Audiotracks im Anschluss an einen oder mehrere Datentracks in jeder Session ausgezeichnet werden.

8. Gerät (3) nach einem der Ansprüche 4 bis 7, wobei der plattenförmige Aufzeichnungsträger (10) außerdem einen Programmspeicherbereich (PMA) aufweist, um Information einschließlich Plattenartencodes in bezug auf die Datentracks und die Audiotracks aller Sessionen (SS1, ...) darauf aufzuzeichnen, und wobei das Gerät (3) außerdem einen Speicher aufweist, um die Information, welche im Programmspeicherbereich aufgezeichnet ist, zu speichern.

9. Gerät (3) nach Anspruch 8, wobei die Codeaufzeichnungs-Steuerungseinrichtung (30) ermittelt, wenn ein Anfangstrack (TNO = 01) einer Session (SS1, ...) nicht ein Audiotrack (TNO) ist, und, wenn dies so ist, sie zur Aufzeichnungseinrichtung (40) vom Speicher den Plattenartencode liefert, der im Programmspeicherbereich (PMA) aufgezeichnet ist, so dass der allgemeine Plattenartencode im Plattenarten-Codebereich (PSEC) der Session durch die Aufzeichnungseinrichtung (40) aufgezeichnet wird.

10. Gerät (3) zum Reproduzieren von Audiodaten und/oder Computerdaten von einem plattenförmigen Aufzeichnungsträger (10), der mehrere Sessionen (SS1, ...) hat, die jeweils aus einem oder mehreren Tracks (TNO = 01, ...) bestehen, wobei die Tracks (TNO = 01, ...) einen oder mehrere Audiotracks aufweisen, die Audiodaten, die darauf aufgezeichnet sind, haben, und einen oder mehrere Datentracks, die Computerdaten, die darauf aufgezeichnet sind, haben, wobei Information bezüglich der Tracks aller Sessionen in einem Programmspeicherbereich (PMA) aktualisiert und gespeichert sind, wobei das Gerät aufweist:

eine Wiedergabeeinrichtung (40), um Signale, welche den Audiodaten oder den Computerdaten vom plattenförmigen Aufzeichnungsträger (10) entsprechen, zu reproduzieren;

eine Decodiereinrichtung (33), um die wiedergegebenen Signale in die Audiodaten oder die Computerdaten zu decodieren;

eine Unterscheidungseinrichtung (30), um zwischen einer Audiosession, in welcher lediglich Audiotracks aufgezeichnet sind, und einer Session, in welcher zumindest ein oder mehrere Datentracks aufgezeichnet sind, mittels eines Plattenartencodes zu unterscheiden, der in einem Plattenartencodebereich (PSEC) aufgezeichnet ist, der in jeder der Sessionen (SS1, ...) angeordnet ist, wobei der Plattenartencode zeigt, ob die Session lediglich einen oder mehrere Audiotracks oder zumindest einen Datentrack enthält; und

eine Steuerung (30), um den Decodierbetrieb durch die Decodiereinrichtung (32) als Antwort auf den Plattenartencode, der durch die Unterscheidungseinrichtung unterschieden wird, umzuschalten, so dass die Audiodaten und die Computerdaten passend durch die Decodiereinrichtung decodiert werden, wobei die Audiosession einer ersten Session (SS1) unter den mehreren Sessionen (SS1, ...) entspricht, und wobei die Unterscheidungseinrichtung die erste Session (SS1) als Audiosession als Antwort auf den Plattenartencode, der im Plattenartencodebereich (PSEC) der ersten Session (SS1) aufgezeichnet ist, identifiziert.

11. Gerät (3) nach Anspruch 10, wobei die mehreren Sessionen (SS1, ...) jeweils einen Einlaufbereich (LIA), der den Anfang der Session angibt und den Plattenartencodebereich (PSEC) aufweist, einen Programmbereich (PRA), der einen oder mehrere Audiotracks oder einen oder mehrere Datentracks hat, und einen Auslaufbereich (LOA) enthält, der das Ende der Session angibt.

12. Gerät (3) nach Anspruch 10 oder 11, bei dem in einer Session, die sowohl die Audiotracks als auch die Datentracks enthält, der Audiotrack im Anschluss an alle Datentracks vorgesehen ist.

13. Gerät (3) nach Anspruch 12, wobei der Plattenartencodebereich (PSEC) an einem Anfang eines Datentracks in

jeder Datensession angeordnet ist.

Revendications

1. Support d'enregistrement en forme de disque (10) comportant plusieurs sessions (SS1, ...) constituées chacune d'une ou de plusieurs pistes (TNO = 01, ...), dans lequel les pistes (TNO = 01, ...) incluent une ou plusieurs pistes audio enregistrées sur ces pistes et une ou plusieurs pistes de données contenant des données d'ordinateur enregistrés sur ces pistes,
 - chaque session comportant une zone de code de type de disque (PSEC), dans laquelle l'un d'un code de type de disque commun et d'un code de type de disque particulier est enregistré, un code de type de disque particulier étant enregistré dans la zone de code de type de disque (PSEC) située dans une session audio constituée seulement d'une ou de plusieurs pistes audio,
 - dans lequel ladite session audio correspond à la première session (SS1) parmi la pluralité de sessions (SS1, ...),
 - ladite première session (SS1) correspond à la session la plus intérieure radialement par rapport au support d'enregistrement en forme de disque (10), et
 - des informations concernant les pistes de toutes les sessions sont mises à jour et sauvegardées dans une zone de mémoire de programme (PMA).
2. Support d'enregistrement en forme de disque (10), selon la revendication 1, dans lequel une pluralité de sessions (SS1, ...) sont constituées chacune par une zone d'entrée (LIA) spécifiant le début de la session et possédant la zone de code de type de disque (PSEC), une zone de programme (PRA) comportant la ou la pluralité de pistes audio et la ou la pluralité de pistes de données, et une zone de sortie (LOA) spécifiant la fin de la session.
3. Support d'enregistrement en forme de disque (10) selon l'une quelconque des revendications précédentes, dans lequel, dans une session constituée à la fois des pistes audio et des pistes de données, la piste audio (NTO) est prévue à la suite de l'ensemble des pistes de données.
4. Dispositif (3) pour l'enregistrement de données audio et/ou de données d'ordinateur sur un support d'enregistrement en forme de disque (10) possédant une pluralité de sessions (SS1, ...) constituées chacune par une zone de code de type de disque (PSEC) et une ou plusieurs pistes (TNO = 01, ...), les pistes (TNO = 01, ...) incluant au moins une piste audio contenant des données audio enregistrées sur cette piste et une ou plusieurs pistes de données contenant des données d'ordinateur enregistrées sur ces pistes, et dans lequel une session particulière est une session audio comportant seulement une ou plusieurs pistes audio, et des informations concernant les pistes de toutes les sessions sont mises à jour et sauvegardées dans une zone de mémoire de programme (PMA), le dispositif comprenant:
 - des moyens d'enregistrement (40) pour enregistrer des données audio ou des données d'ordinateur dans chaque session sur le support d'enregistrement en forme de disque (10);
 - des moyens (30) de commande d'enregistrement de données pour commander les moyens d'enregistrement (40) de sorte que seules des données audio sont enregistrées dans la session particulière, et pour réaliser l'enregistrement de données audio ou de données d'ordinateur dans d'autres sessions; et
 - des moyens (30) de commande d'enregistrement d'un code de type de disque pour réaliser l'enregistrement d'un code de type de disque particulier indiquant que la session est constituée uniquement par les pistes audio devant être enregistrées, dans la zone de code de type de disque (PSEC) dans la session particulière,
 - dans lequel lesdits moyens de commande d'enregistrement (30) définissent la première session (SS1) de la pluralité de sessions (SS1, ...) comme étant ladite session particulière et seules des données audio sont enregistrées dans ladite première session (SS1).
5. Dispositif (3) selon la revendication 4, dans lequel les moyens d'enregistrement du code de type de disque commandent les moyens d'enregistrement (40) pour enregistrer un code de type de disque commun dans une zone de code de type de disque (PSEC) de chacune des sessions autres que la session particulière pour indiquer ainsi que chacune de telles autres sessions contient une piste de données.
6. Dispositif (3) selon la revendication 4 ou 5, dans lequel la pluralité de sessions (SS1 ...) sont constituées chacune par une zone d'entrée (LIA) spécifiant le début d'une session et possédant la zone de code de type de disque

(PSEC), une zone de programme (PRA) constituée par la ou la pluralité de pistes audio et la ou la pluralité de pistes de données, et une zone de sortie (LOA) spécifiant la fin de la session.

- 5 7. Dispositif (3) selon l'une quelconque des revendications 4 à 6, dans lequel les moyens de commande d'enregistrement (30) commandent l'enregistrement des données audio et des données d'ordinateur dans une ou plusieurs sessions constituées chacune d'une ou de plusieurs pistes audio et d'une ou de plusieurs pistes de données, la piste audio ou la pluralité de pistes audio étant enregistrées à la suite de la piste de données ou de la pluralité de pistes de données dans chaque session.
- 10 8. Dispositif (3) selon l'une quelconque des revendications 4 à 7, dans lequel le support d'enregistrement en forme de disque (10) comprend en outre une zone de mémoire de programme (PMA) pour enregistrer une information, y compris des codes de type de disque, en rapport avec les pistes de données et avec les pistes audio de toutes les sessions (SS1, ...), et dans lequel le dispositif (3) comporte en outre des moyens de mémoire pour mémoriser l'information enregistrée dans la zone de mémoire de programme.
- 15 9. Dispositif (3) selon la revendication 8, dans lequel les moyens de commande d'enregistrement de code (30) détectent si une piste d'entrée (TNO = 01) d'une session (SS1, ...) n'est pas une piste audio (TNO) et, si c'est le cas, envoient aux moyens d'enregistrement (40), à partir des moyens de mémoire, le code de type de disque enregistré dans la zone de mémoire de programme (PMA) de sorte que le code de type de disque commun est enregistré dans la zone de code de type de disque (PSEC) de la session, par les moyens d'enregistrement (40).
- 20 10. Dispositif (3) pour reproduire des données audio ou des données d'ordinateur à partir d'un support d'enregistrement en forme de disque (10) possédant plusieurs sessions (SS1, ...) dont chacune comporte une ou plusieurs pistes, les pistes incluant une ou plusieurs pistes audio comportant des données audio enregistrés sur ces pistes et une ou plusieurs pistes de données comportant des données d'ordinateur enregistrées sur ces pistes des informations concernant les pistes de toutes les sessions étant mises à jour et sauvegardées dans une zone de mémoire de programme (PMA), le dispositif comprenant:

des moyens de reproduction (40) pour reproduire des signaux correspondant aux données audio ou aux données d'ordinateur à partir du support d'enregistrement en forme de disque (10);
des moyens de décodage (33) pour décoder les signaux reproduits pour former les données audio ou les données d'ordinateur;
des moyens de discrimination (30) pour établir une discrimination entre une session audio, dans laquelle seules des pistes de données sont enregistrées, et une session, dans laquelle au moins une ou plusieurs
35 pistes de données sont enregistrées, au moyen d'un code de type de disque enregistré dans une zone de code de type de disque (PSEC) située dans chacune des sessions (SS1, ...), le code de type de disque indiquant si la session inclut seulement une ou plusieurs pistes audio ou au moins une piste de données; et
des moyens de commande (30) pour commuter l'opération de décodage à l'aide des moyens de décodage (32) en réponse au code de type de disque discriminé par les moyens de discrimination de telle sorte que les
40 données audio et les données d'ordinateur sont décodées de façon appropriée par les moyens de décodage,

dans lequel la session audio correspond à une première session (SS1) parmi la pluralité de sessions (SS1, ...) et dans lequel les moyens de discrimination identifient la première session (SS1) comme étant la session audio en réponse au code de type de disque enregistré dans la zone de code de type de disque (PSEC) de la première
45 session (SS1).
- 50 11. Dispositif (3) selon la revendication 10, dans lequel la pluralité de sessions (SS1, ...) sont constituées chacune par une zone d'entrée (LIA) spécifiant le début de la session et possédant la zone de code de type de disque (PSEC), une zone de programme (PRA) comportant la ou la pluralité de pistes audio et la ou la pluralité de pistes de données, et une zone de sortie (LOA) spécifiant la fin de la session.
12. Dispositif (3) selon la revendication 10 ou 11, dans lequel, dans une session constituée à la fois par les pistes audio et les pistes de données, la piste audio (TNO) est prévue à la suite de l'ensemble des pistes de données.
- 55 13. Dispositif (3) selon la revendication 16, dans lequel la zone de code de type de disque (PSEC) est située au niveau d'une extrémité avant d'une piste de données dans chaque session de données.

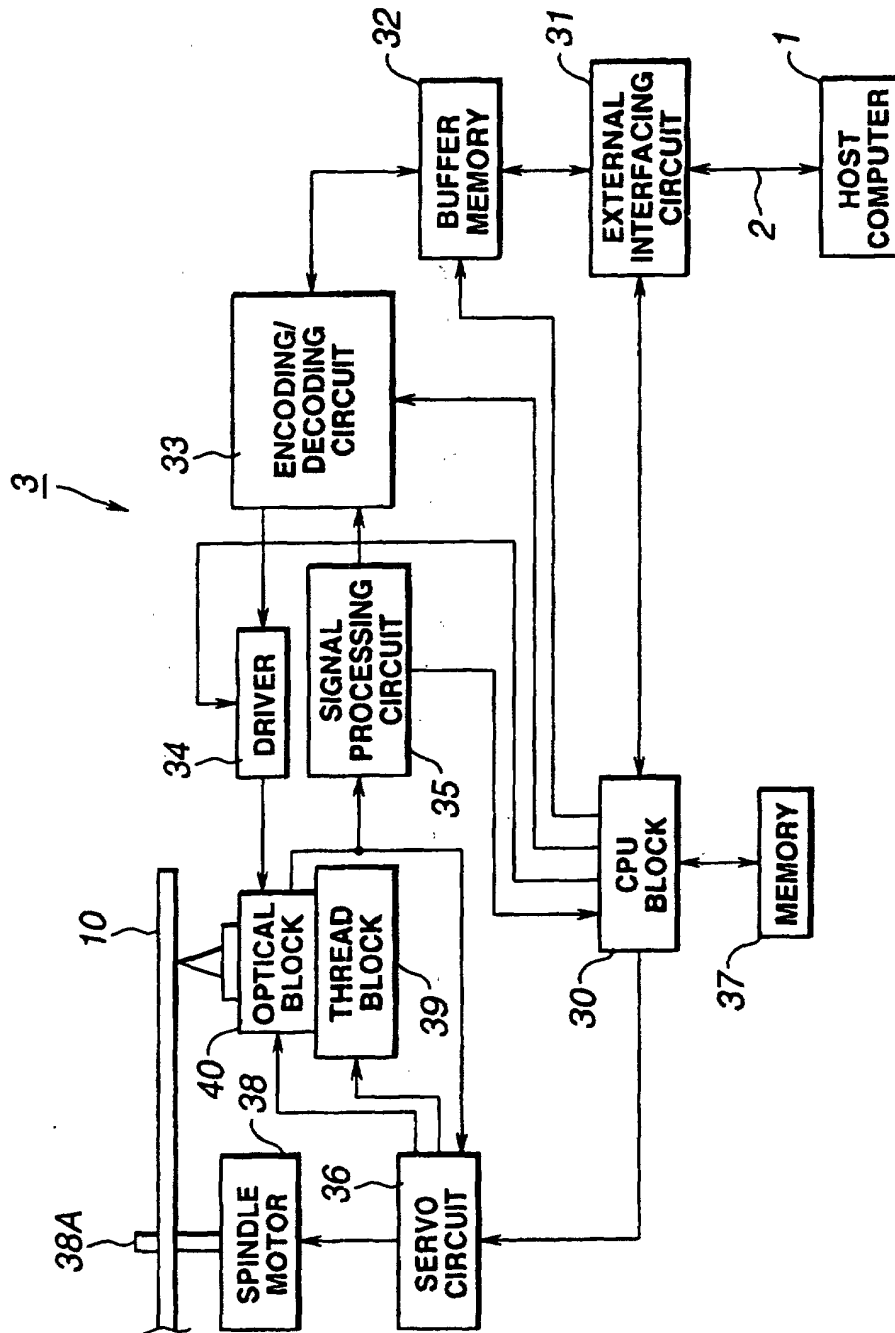


FIG.1

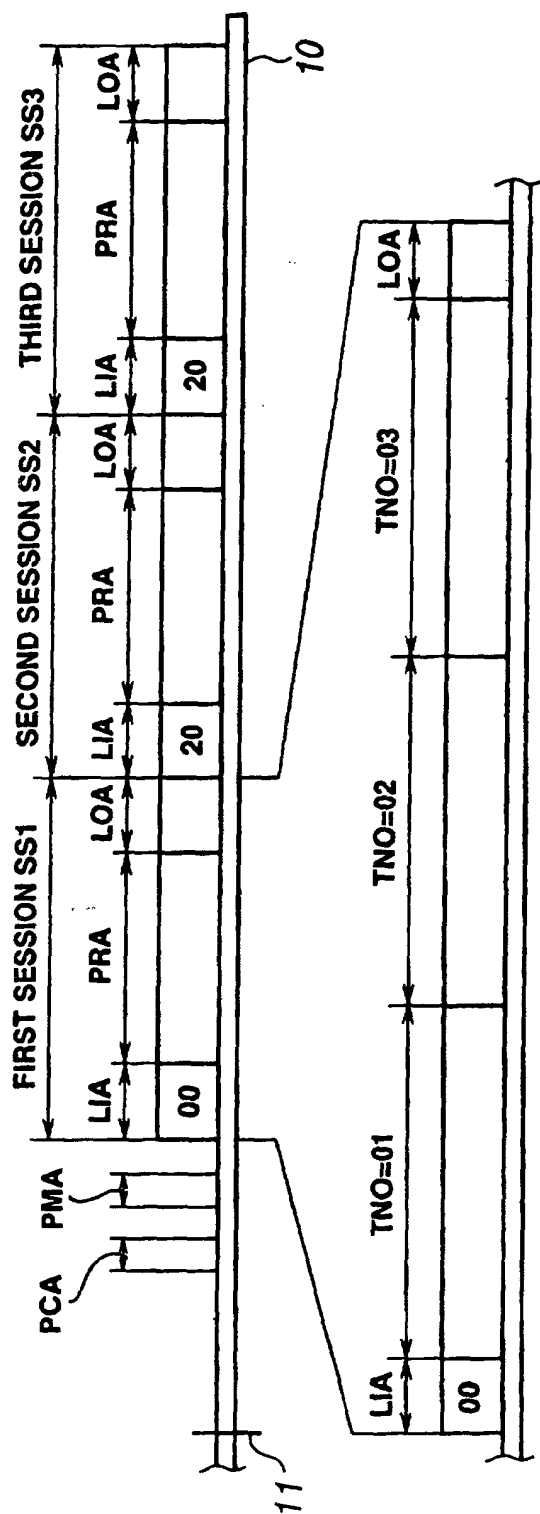


FIG.2



FIG.3

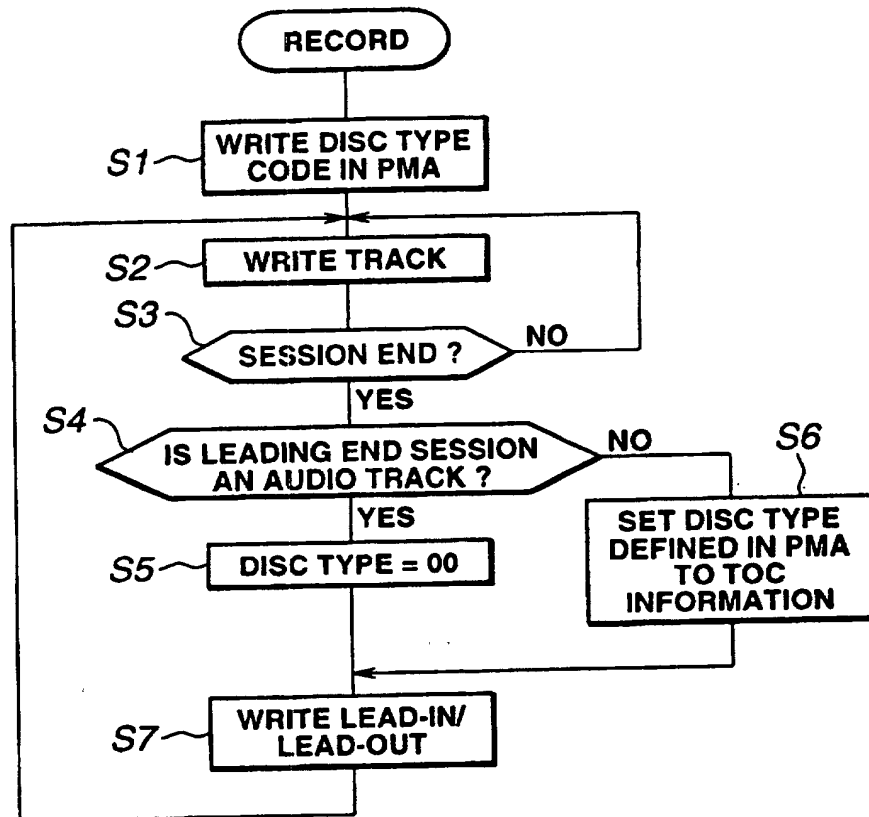


FIG.4

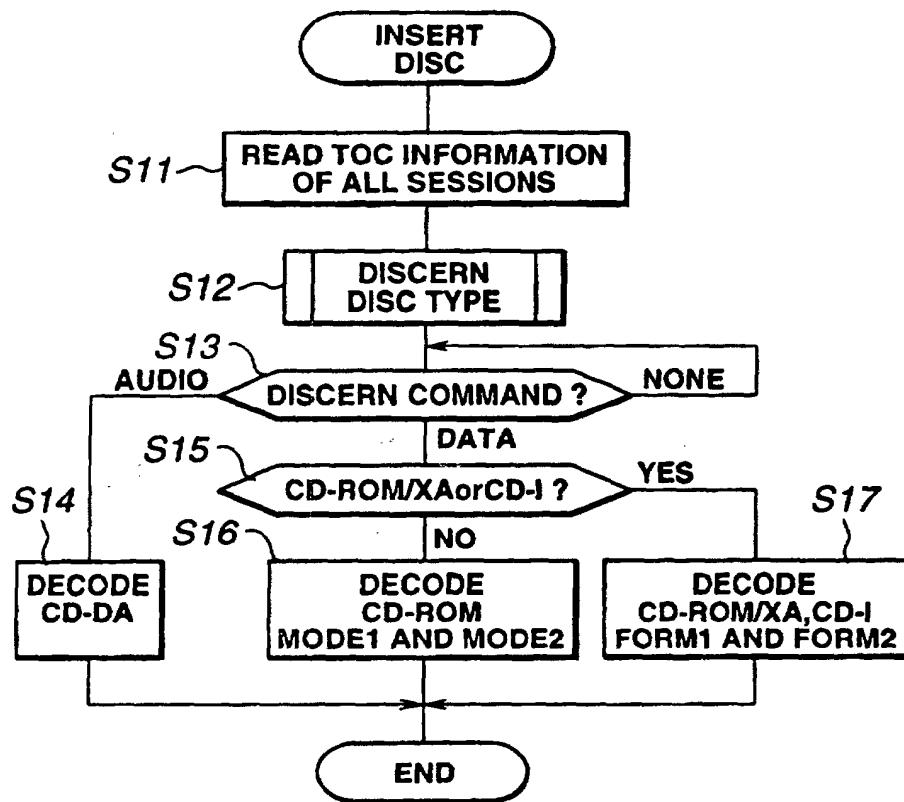


FIG.5

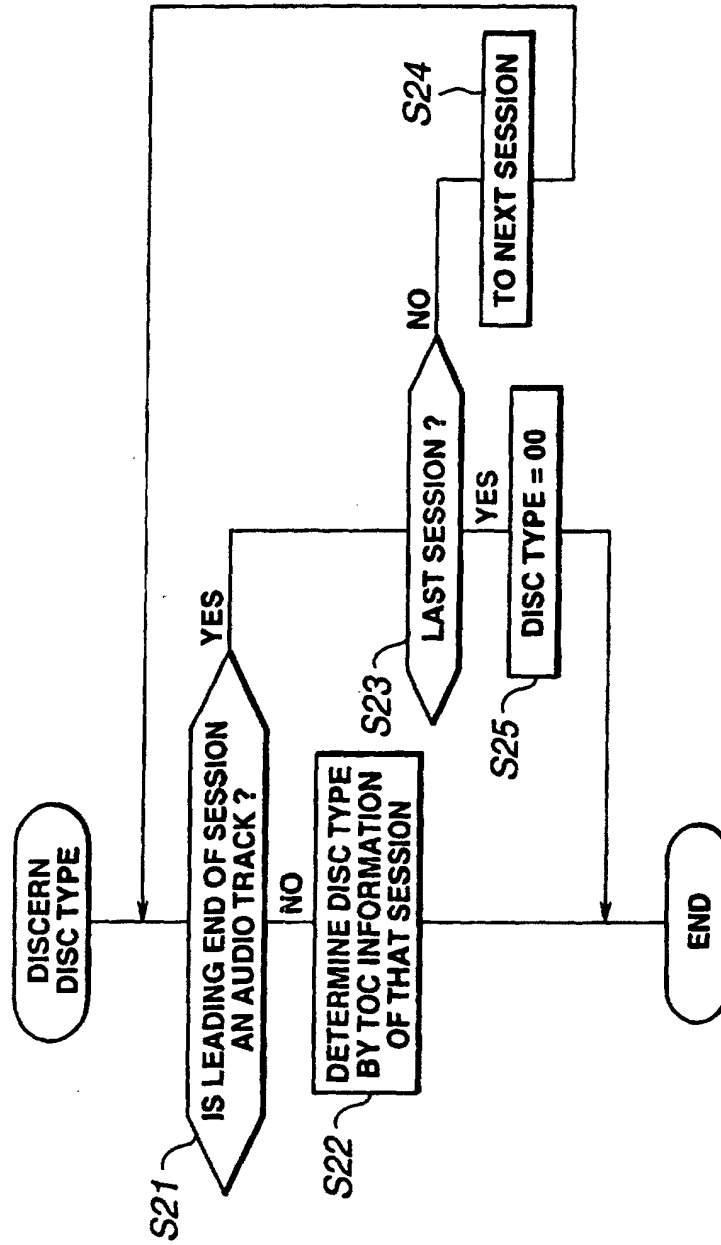


FIG.6

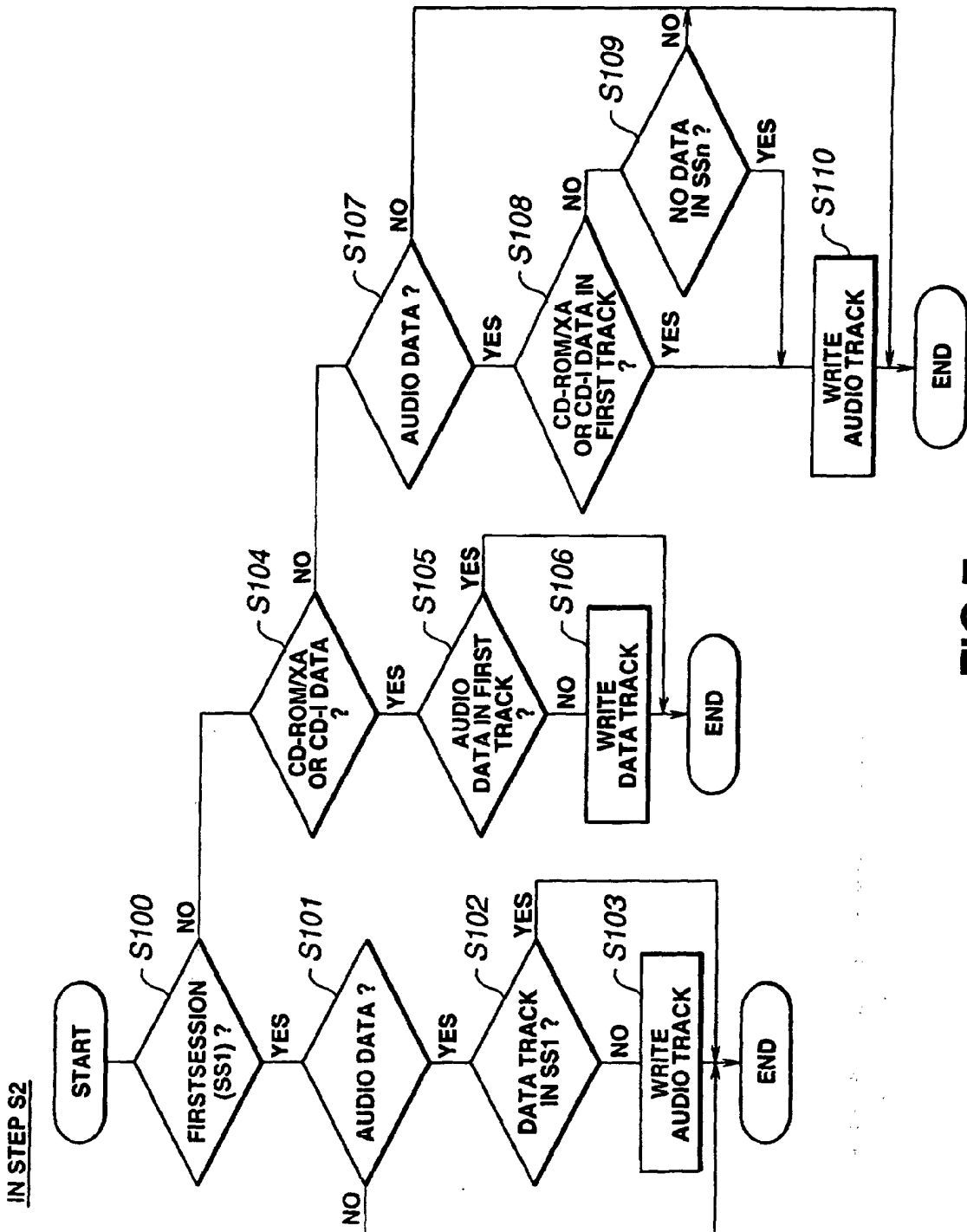


FIG. 7